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Schnitzer

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November 25, 2019

Carol Lee
Supervising Air Quality Engineer
Bay Area Air Quality Management District
Engineering Division
375 Beale Street, Suite 600
San Francisco, CA 94105

RE: ***Response to October 28, 2019 BAAQMD Letter of Incompleteness***
Plant #208 – Schnitzer Steel Industries
Application #30009

Ms. Lee:

Schnitzer Steel Industries (Schnitzer) owns and operates a scrap metal recovery, shredding, and recycling facility in Oakland, California (the Facility) within the jurisdiction of the Bay Area Air Quality Management District (BAAQMD). Schnitzer operates the Facility under a Permit to Operate (PTO) for Plant ID #208.

On July 3, 2019, Schnitzer submitted an Authority to Construct (ATC) permit application (the Application) to BAAQMD for the installation of two regenerative thermal oxidizer (RTO) control devices and two packed bed scrubbers to supplement the existing shredder abatement system. The purpose of the RTOs is to reduce precursor organic compound (POC) emissions at the Facility.

On October 28, 2019, Schnitzer received a letter from BAAQMD deeming the Application incomplete and requesting additional information necessary to complete the Application (the Letter of Incompleteness). This response letter includes Schnitzer's responses to the questions raised by BAAQMD. The comments and questions in the Letter of Incompleteness are set forth below in bold font, followed by Schnitzer's responses in plain text:

In order to complete your application, the following is needed before we can proceed ahead to perform the Health Risk Assessment (HRA):

1. **The hourly emission rates used in your emission estimates are based on a maximum hourly processing rate of [redacted] tons per hour (tons/hr), while S-6 and S-7 are currently limited to [redacted] tons/hr based on the data provided on the initial data forms in Application # 14194. We can run the Health Risk Assessment (HRA) on [redacted] tons/hr, but you would need to apply for this modification at S-6 and S-7. Is it your intention to apply for a permit modification? Additional fees would be required for this request. Let us know if you are proposing to modify S-6 and S-7 by increasing the throughput limit to [redacted] ton/hr? Additional permit fees and information will be required.**

   Schnitzer understands that the currently permitted throughput rate is [redacted] ton/hr and that an application will need to be submitted for a throughput increase at S-6 and S-7. Schnitzer will submit the modification application as soon as possible to increase the S-6 and S-7 maximum hourly throughput rate from [redacted] tons/hr to [redacted] tons/hr in a separate submittal and understands that additional fees will apply. Schnitzer requests that the District complete its analysis for the Application based on the proposed [redacted] ton/hr throughput rate.

2. **Your maximum pre-project emission rate of 263 pounds per hour (lb/hr) of POC was never achieved nor approved because it would be in excess (and in violation) to Regulation 8-2-301. This rate may be acceptable for determining post-project POC emission limit (after controls by the thermal oxidizers), but it should not be used for calculation POC emissions reductions. To be equivalent to 300 ppmv total carbon (8-2-301 limit), stack emissions should not exceed 112.0 lb/hr. This should be the maximum baseline emission rate, per Regulation 2-2-603. Please reflect your allowable pre-project emission rate accordingly in your emission estimate spreadsheet.**

   Schnitzer is using a pre-POC control emission rate of 263 lb/hr to calculate the post-project POC emissions reflecting the control efficiency for the RTOs. Schnitzer has updated the emission calculation nomenclature in Table 4 of the Application emission calculations (included in this submittal as Attachment 1) to indicate that the 263 lb/hr value is a "Pre-POC Control Emission Rate" being used to calculate post-project emissions and is not a pre-project emission value approved by BAAQMD. Additionally, Schnitzer would like to note that no emission reduction credits (ERCs) are being calculated nor requested using the 263 lb/hr value as part of this Application. Also note that while Schnitzer disagrees with the District's calculation of 112 lbs/hr as being equivalent to a limit of 300 ppmv total carbon, that disagreement is not relevant to this permit application.

3. **Your maximum pre-project emission rate of 5 lb/hr of PM, PM10, and PM2.5 was never demonstrated and may be too low. For P-15 stack to meet a 0.046 gr/dscf limit, the estimated emission rate would be 5.91 lb/hr. The maximum emission rate based on the 2017-2019 source tests was 3.8 lb/hr, but this rate could easily be exceeded based on the variability of the source test data to date. The 5.91 lb/hr emission rate limit takes this variability into consideration. In addition, you will need to include some consideration for PM generated by the combustion process when setting new PM limits for the new stacks.**

   Schnitzer has updated the Application emission calculations to reflect the 5.91 lb/hr PM emission rate, included as Attachment 1 of this submittal. Schnitzer agrees PM emissions generated by the combustion of natural gas in the RTO should be considered for stack emission limits which is why Schnitzer included such emission calculations in the Application submittal under Table 13 to 15, included again with this submittal in Attachment 1.

4. **It appears that your fugitive TAC emissions were not calculated correctly. Your calculation of building fugitives = current stack emission factor/(building capture fraction 0.95)-current stack emission factor is acceptable for use for organic toxic air contaminants (TACs) because the venturi scrubbers before the current stack are achieving no control of organic TAC emissions. However, metal particulates are abated by the venture scrubbers prior to entering the stack. To estimate the amount generated by the process, you need to include the control efficiency of the venturi scrubbers. The venturi scrubber controls were supposed to achieve 99% control of PM emissions, but the source tests were not able to demonstrate this. We estimate 90% control as reasonable for each metal TAC. Please adjust your fugitive calculations to reflect this PM control efficiency.**

   Schnitzer has updated the shredder fugitive emission calculations to reflect the particulate abatement by the venturi scrubbers for both metal TACs and particulate emissions. The venturi scrubber control efficiency has been updated to 90% per BAAQMD's suggestion. Schnitzer has also revised the shredder fugitive emissions for organic TACs to ensure the RTO control efficiency was accounted for properly. The revised emission calculations are included in Attachment 1 .

5. **Only one source test for hexavalent chromium emissions was used to estimated [sic] emissions for this TAC. If two source tests were used, estimated emission would be considerably higher. Using the higher emission factors from the two source test results, proposed stack emissions from P-17 and P-18 are 0.1225 lbs/yr per stack and 6.805E-05 lb/hr stack (at [redacted] ton/hr throughput). Fugitive emissions will need corrections for both the equation and the factor. The District estimates fugitive hexavalent chromium emissions are 0.13 lb/yr and 7.2E-05 lb/hr (at [redacted] ton/hr). Please review your use of source tests and use an average of several source tests and not just 1 source test only unless you are taking the source test with the maximum detected level. In the case of non-detect values, use half the detection level.**

   As previously discussed with BAAQMD, the January 2018 source test results for hexavalent chromium from the shredder were likely adversely impacted by artifact formation of hexavalent chromium in the sampling train due to the presence of trace quantities of trivalent chromium in the sample and a high pH in the impinger train. Schnitzer believes that the following hexavalent chromium emission factors for the shredder, based on the District-approved source tests conducted in October 2018 using an improved sampling method, are the more accurate emission factors determined for S-6. The October 2018 shredder emission factors for hexavalent chromium are: [redacted] lbs/ton infeed (when the results are blank-corrected), or [redacted] lbs/ton infeed if the District elects not to correct the measurements to reflect the high blank concentrations found during these tests (even with the improved test method). Note that the [redacted] lbs/ton infeed emission factor is conservatively used in the emission calculations.

6. **Hydrogen chloride and hydrogen fluoride emission estimates are missing from your stack emission tables. In addition, hydrogen chloride and hydrogen fluoride emission estimates did not include chlorine and fluorine, respectively, from non-TACs such as trichlorofluoromethane, chlorodifluoromethane, and dichlorodifluoromethane, which contribute significantly to HCL emissions. Please calculate hydrogen chloride and hydrogen fluoride emission [sic] from the stack after abatement by the thermal oxidizers.**

   Schnitzer has updated the emission calculations to reflect the hydrogen chloride and hydrogen fluoride formation from non-TACs, based upon the January 2019 source test results provided in Attachment 2 of this submittal for chlorinated and fluorinated compounds. The source test results in Attachment 2 conservatively replace all below reporting limit (BRL) values with 50% of the reporting limit if detection of the compound in question was attempted and was successful in at least one of three runs. A zero is used if detection of the compound in question was attempted and all three results were below the detection limit, or if the compound was not identified in a run. Schnitzer has conservatively assumed complete formation of hydrogen chloride and hydrogen fluoride from halogenated compounds. Additionally, the acid gas scrubber control efficiency of 98% has been applied to the hydrogen chloride and hydrogen fluoride emissions. Finally, upon review of the January 2019 source test results, Schnitzer has added four compounds (cumene, hexachloroethane, methyl isobutyl ketone, and 2,2,4-trimethylpentane), which are considered hazardous air pollutants but are not considered TACs, to the emission calculations for completeness purposes. Note the addition of these four compounds does not change any permitting conclusions for the Application. See the emission calculations in Attachment 1 for more details.

Please note that this submittal in its entirety should be considered confidential on the basis that it contains critical detailed process and equipment design information including throughput values, operating hours, and firing rates. Further, the production data and process design information are considered as trade secret based upon Government Code Section 6254.7(d). Schnitzer will provide a public version of this submittal, including electronic emission calculation workbooks, in a subsequent submittal as soon as possible.

We appreciate BAAQMD's review of this information. Please do not hesitate to contact me at (510) 839-4714 or Scott Sloan at (425) 420-1863 if you have any questions regarding this submittal.

Sincerely,

Pamela Gray

Pamela Gray
Regional Environmental Manager, West

Attachments

Attachment 1 – Updated Emission Calculations

Table 1. Facility Criteria Pollutant Potential to Emit (PTE) Summary

Pollutant	Hourly Emissions	Monthly Emissions	Annual Emissions	BAAQMD Rule 2-6-212 Major Source Threshold	Exceeds Major Source Threshold?
	(lb/hr)	(lb/month)	(tpy)	(tpy)	(Yes/No)
POC	19.20	2903	17.42	100	No
PM	9.18	1423	8.54	100	No
PM_{10}	9.16	1408	8.45	100	No
$PM_{2.5}$	9.16	1406	8.44	100	No
NO_x	0.91	340	2.04	100	No
CO	1.52	571	3.43	100	No
SO_2	0.01	4.08	0.02	100	No

Table 2. Facility Toxic Air Contaminant (TAC) and Hazardous Air Pollutant (HAP) Emission Summary[1]

Pollutant	Hazardous Air Pollutant (HAP)?	Hourly Emissions	Monthly Emissions	Annual Emissions	BAAQMD Rule 2-6-212 Major Source Threshold	Exceeds Major Source Threshold?
	(Yes/No)	(lb/hr)	(lb/month)	(lb/yr)	(tpy)	(Yes/No)
Acetaldehyde	Yes	2.32E-02	3.49E+00	4.18E+01	--	--
Arsenic	Yes	1.06E-08	7.74E-06	9.29E-05	--	--
Benzene	Yes	8.52E-02	1.28E+01	1.53E+02	--	--
Beryllium	Yes	1.22E-09	8.87E-07	1.06E-05	--	--
Butadiene, 1,3-	Yes	2.20E-03	3.30E-01	3.96E+00	--	--
Cadmium	Yes	6.95E-04	1.04E-01	1.25E+00	--	--
Cumene	Yes	5.91E-03	8.86E-01	1.06E+01	--	--
Ethyl Benzene	Yes	1.80E-01	2.71E+01	3.25E+02	--	--
Hydrogen Chloride	Yes	8.05E-03	1.21E+00	1.45E+01	--	--
Hydrogen Fluoride	Yes	2.54E-03	3.82E-01	4.58E+00	--	--
Hexane	Yes	2.61E-01	3.92E+01	4.70E+02	--	--
Hexavalent Chromium	Yes	3.09E-05	4.64E-03	5.56E-02	--	--
Hexachloroethane (PCA)	Yes	7.10E-01	1.07E+02	1.28E+03	--	--
Isopropyl Alcohol	No	2.61E-02	3.92E+00	4.70E+01	--	--
Lead	Yes	4.91E-03	7.37E-01	8.84E+00	--	--
Manganese	Yes	2.93E-07	2.14E-04	2.56E-03	--	--
Methanol	Yes	3.96E-02	5.95E+00	7.14E+01	--	--
Methyl Chloroform	Yes	1.38E-02	2.08E+00	2.49E+01	--	--
Methyl Ethyl Ketone	No	3.91E-02	5.87E+00	7.04E+01	--	--
Methyl Isobutyl Ketone	Yes	3.97E-03	5.95E-01	7.15E+00	--	--
Methylene Chloride	Yes	6.30E-03	9.45E-01	1.13E+01	--	--
Nickel	Yes	1.05E-07	7.63E-05	9.15E-04	--	--
Perchloroethylene	Yes	8.52E-03	1.28E+00	1.53E+01	--	--
PCBs	Yes	1.25E-03	1.88E-01	2.25E+00	--	--
Propylene	No	5.47E-02	8.20E+00	9.84E+01	--	--
Styrene	Yes	2.81E-02	4.22E+00	5.06E+01	--	--
Sulfate	No	2.11E+02	1.54E+05	1.84E+06	--	--
Toluene	Yes	7.31E-01	1.10E+02	1.32E+03	--	--
Trimethylpentane, 2,2,4-	Yes	3.00E-01	4.50E+01	5.40E+02	--	--
Xylenes (mixed)	Yes	6.74E-01	1.01E+02	1.21E+03	--	--
o-Xylene	Yes	2.48E-01	3.72E+01	4.46E+02	--	--
Highest Individual HAP - Toluene (tpy)	--	--	--	0.66	10	No
Total HAPs (tpy)	--	--	--	3.00	25	No

1. TAC emission summary based on emission best estimates for all sources at the Facility.

Table 3. Shredder Parameters

Parameter	Value	Units
Source ID (S#)	S-6, S-7	
Maximum Annual Throughput[1]	720,000	tpy
Maximum Hourly Throughput[2]	[redacted]	tph
Shredder Enclosure Capture Efficiency[3]	95	%
Venturi Scrubber Control Efficiency[4]	90	%
RTO Control Efficiency[4]	98	%
Acid Gas Scrubber Control Efficiency[4]	98	%

1. Maximum Annual Throughput obtained from BAAQMD PTO issued on October 22, 2018 for Plant # 208.
2. Maximum Hourly Throughput obtained from proposed emission limits letter dated May 29, 2018 submitted to BAAQMD.
3. Shredder Enclosure Capture Efficiency per emission limits letter dated May 29, 2018 submitted to BAAQMD.
4. Venturi Scrubber, RTO, and Acid Gas Scrubber control efficiencies are based on Schnitzer's Massachusetts facility where similar devices are being installed.

Table 4. Shredder Stack Criteria Pollutant PTE Summary

Pollutant	Pre-POC Control Emission Rate[1] (lb/hr)	Post-Project Emission Factor[2,3] (lb/ton)	Hourly Emissions[4] (lb/hr)	Monthly Emissions[5] (lb/month)	Annual Emissions[6] (tpy)
POC	263	[redacted]	5.26	789	4.73
PM	5.91	[redacted]	5.91	886.5	5.32
PM_{10}	5.91	[redacted]	5.91	886.5	5.32
$PM_{2.5}$	5.91	[redacted]	5.91	886.5	5.32

1. POC emission factor (lb/hr) obtained from proposed emission limits letter dated May 29, 2018 submitted to BAAQMD. Emission rates account for the shredder enclosure capture efficiency of 95% . PM emission factor (lb/hr) per BAAQMD Engineering Evaluation for Application 27762 dated September 2019.
2. The uncontrolled emission factor for POC is based on the [redacted] lb/ton value per January 2019 Source Test submitted to BAAQMD. The RTO Control Efficiency is applied to this value.
3. Emission Factor for PM (lb/ton) = Emission Rate (lb/hr) / Maximum Hourly Throughput (ton/hr)).
4. Hourly Emissions (lb/hr) = Emission Factor (lb/ton) * Maximum Hourly Throughput (tons/hr).
5. Monthly Emissions (lb/month) = Annual Emissions (tpy) * 2000 (lb/ton) / 12 (months/yr).
6. Annual Emissions (tpy) = Emission Factor (lb/ton) * Maximum Annual Throughput (ton/yr) / 2000 (lb/ton).

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Table 5. Shredder Stack TAC and HAP Emission Summary

Pollutant	HAP[1]	Emission Factor[2]	Hourly Emissions[3]	Monthly Emissions[4]	Annual Emissions[5]
	(Yes/No)	(lb/ton)	(lb/hr)	(lb/month)	(tpy)
Acetaldehyde	Yes	[redacted]	6.40E-03	9.60E-01	5.76E-03
Benzene	Yes		2.35E-02	3.52E+00	2.11E-02
Butadiene, 1,3-	Yes		6.06E-04	9.09E-02	5.45E-04
Cadmium	Yes		4.55E-04	6.83E-02	4.10E-04
Cumene	Yes[6]	[redacted]	1.63E-03	2.44E-01	1.46E-03
Ethyl Benzene	Yes		4.97E-02	7.45E+00	4.47E-02
Hexane	Yes		7.20E-02	1.08E+01	6.48E-02
Hexachloroethane (PCA)	Yes[6]	[redacted]	1.96E-01	2.93E+01	1.76E-01
Hexavalent Chromium	Yes		2.02E-05	3.03E-03	1.82E-05
Isopropyl Alcohol	No		7.19E-03	1.08E+00	6.48E-03
Lead	Yes		3.22E-03	4.83E-01	2.90E-03
Methanol	Yes		1.09E-02	1.64E+00	9.83E-03
Methyl Chloroform	Yes		3.81E-03	5.72E-01	3.43E-03
Methyl Ethyl Ketone	No		1.08E-02	1.62E+00	9.69E-03
Methyl Isobutyl Ketone (MiBK)	Yes[6]	[redacted]	1.51E-03	2.26E-01	1.36E-03
Methylene Chloride	Yes		1.73E-03	2.60E-01	1.56E-03
Perchloroethylene	Yes		2.35E-03	3.52E-01	2.11E-03
PCBs	Yes		3.45E-04	5.17E-02	3.10E-04
Propylene	No		1.51E-02	2.26E+00	1.36E-02
Styrene	Yes		7.74E-03	1.16E+00	6.97E-03
Toluene	Yes		2.01E-01	3.02E+01	1.81E-01
Trimethylpentane, 2,2,4-	Yes[6]	[redacted]	8.25E-02	1.24E+01	7.43E-02
Xylenes (mixed)	Yes		1.85E-01	2.78E+01	1.67E-01
o-Xylene	Yes		6.83E-02	1.02E+01	6.15E-02

1. Per BAAQMD Rule 2-2-215, a Hazardous Air Pollutant (HAP) is any pollutant listed pursuant to Section 112(b) of the Clean Air Act.

2. Emission factors based on summarized source test results compiled in spreadsheet submitted to Carol Allen on March 29, 2019 and updated on May 7, 2019. Emission factors for Cumene, PCA, MiBK, and 2,2,4-Trimethylpentane from January 2019 Source Test conducted at Schnitzer's Oakland, CA facility. Emission factors account for the shredder enclosure capture efficiency of 95%.

3. Hourly Emissions (lb/hr) = Emission Factor (lb/ton) * Maximum Hourly Throughput (tons/hr) * (1 - Control Device Efficiency (%)). The Venturi Scrubber is already accounted for in PM emissions while the RTO control is applied to POC emissions. As such, the 98% control efficiency from the RTOs is not applied to cadmium, hexavalent chromium or lead.

4. Monthly Emissions (lb/month) = Annual Emissions (tpy) * 2000 (lb/ton) / 12 (months/yr).

5. Annual Emissions (tpy) = Emission Factor (lb/ton) * Maximum Annual Throughput (ton/yr) / 2000 (lb/ton) * (1 - Control Device Efficiency (%)). The Venturi Scrubber is already accounted for in PM emissions while the RTO control is applied to POC emissions. As such, the 98% control efficiency from the RTOs is not applied to cadmium, hexavalent chromium or lead.

6. Note this pollutant is NOT a TAC.

Table 6. Non-TAC/Non-HAP Chlorinated/Fluorinated Pollutant Emission Summary

Pollutant	Emission Factor[1]	Hourly Emissions[2]	Monthly Emissions[3]	Annual Emissions[4]
	(lb/ton)	(lb/hr)	(lb/month)	(tpy)
1,1-Difluoroethane	[redacted]	1.78E-03	0.27	1.61E-03
2-Chloro-3,3,3-trifluoropropene		2.49E-03	0.37	2.24E-03
Chlorodifluoromethane		4.08E-02	6.12	3.67E-02
Dichlorodifluoromethane (F-12)		2.57E-02	3.86	2.31E-02
Difluoromethane (HFC-32)		1.04E-03	0.16	9.38E-04
Norflurane (HFC-134a)		8.10E-02	12.16	7.29E-02
Trichlorofluoromethane		2.28E-01	34.19	2.05E-01

1. Emission factors based upon January 2019 Source Test conducted at Schnitzer's Oakland, CA facility. Emission factors account for the shredder enclosure capture efficiency of 95%.

2. Hourly Emissions (lb/hr) = Emission Factor (lb/ton) * Maximum Hourly Throughput (tons/hr) * (1 - RTO Control Efficiency (%)).

3. Monthly Emissions (lb/month) = Annual Emissions (tpy) * 2000 (lb/ton) / 12 (months/yr).

4. Annual Emissions (tpy) = Emission Factor (lb/ton) * Maximum Annual Throughput (ton/yr) / 2000 (lb/ton) * (1 - RTO Control Efficiency (%)).

Table 7. Acid Gas Emission Summary

Pollutant[1]	Molecular Weight[2]	Molar Ratio to HCl[3]	Molar Ratio to HF[3]	Hourly Emissions[4]	Monthly Emissions[5]	Annual Emissions[6]
	lb/lbmol	moles	moles	(lb/hr)	(lb/month)	(tpy)
1,1-Difluoroethane	66.05	0	2	See Tables 5 and 6 above.		
2-Chloro-3,3,3-trifluoropropene	130.49	1	3			
Chlorodifluoromethane	86.47	1	2			
Dichlorodifluoromethane (F-12)	120.91	2	2			
Difluoromethane (HFC-32)	52.023	0	2			
Hexachloroethane (PCA)	236.7	6	0			
Norflurane (HFC-134a)	102.03	0	4			
Trichlorofluoromethane	137.36	3	1			
Methyl Chloroform	133.4	3	0			
Methylene Chloride	84.93	2	0			
Perchloroethylene	165.8	4	0			
PCBs[7] (189)	395.3	7	0			
Hydrogen Fluoride	20.006	--	--	2.54E-03	3.82E-01	2.29E-03
Hydrogen Chloride	36.461	--	--	8.05E-03	1.21E+00	7.25E-03

1. Pollutants which have at least one chlorine atom and/or fluorine atom are assumed to be completely converted to acid gas.
2. Molecular weight obtained from U.S. National Library of Medicine, National Center for Biotechnology Information.
3. All chlorine atoms and fluorine atoms are conservatively assumed to be converted to hydrochloric acid and hydrofluoric acid, respectively.
4. Hourly Emissions (lb/hr) = [Σ Hourly Emissions from Shredder (lb/hr) / Molar Weight of Pollutant (lb/lbmol) * Molar Ratio to HCl] * Molar Weight of HCl (lb/lbmol) * (1 - Acid Gas Scrubber Control Efficiency (%)).
5. Monthly Emissions (lb/month) = [Σ Monthly Emissions from Shredder (lb/month) / Molar Weight of Pollutant (lb/lbmol) * Molar Ratio to HCl] * Molar Weight of HCl (lb/lbmol) * (1 - Acid Gas Scrubber Control Efficiency (%)).
6. Annual Emissions (tpy) = [Σ Annual Emissions from Shredder (tpy) * 2000 (lb/ton) / Molar Weight of Pollutant (lb/lbmol) * Molar Ratio to HCl] * Molar Weight of HCl (lb/lbmol) * (1 - Acid Gas Scrubber Control Efficiency (%)) / 2000 (lb/ton).
7. PCBs are assumed to be PCB-189, the congener with the highest number of chlorine atoms considered under BAAQMD Rule 2-5, Table 2-5-1, footnote 7.

Table 8. Shredder Fugitive Criteria Pollutant PTE Summary

Pollutant	Pre-Control Emission Rate[1]	Post-Project Emission Factor[2]	Hourly Emissions[3]	Monthly Emissions[4]	Annual Emissions[5]
	(lb/hr)	(lb/ton)	(lb/hr)	(lb/month)	(tpy)
POC	13.84	[redacted]	13.84	2076.32	12.46
PM	3.11	[redacted]	3.11	466.58	2.80
PM_{10}	3.11	[redacted]	3.11	466.58	2.80
$PM_{2.5}$	3.11	[redacted]	3.11	466.58	2.80

1. POC Fugitive Emission Rate (lb/hr) = [Stack Emission Rate (lb/hr)/(Shredder Enclosure Capture Efficiency)] - Stack Emission Rate (lb/hr).
Particulate Fugitive Emission Factor (lb/ton) = [Stack Emission Factor (lb/ton) / Shredder Enclosure Capture Efficiency (%) / (1 - Venturi Scrubber Control Efficiency (%))] - [Stack Emission Factor (lb/ton) / (1 - Venturi Scrubber Control Efficiency (%))].
2. Post-Project Emission Factor (lb/ton) = Emission Rate (lb/hr) / Maximum Hourly Throughput (ton/hr).
3. Hourly Emissions (lb/hr) = Emission Factor (lb/ton) * Maximum Hourly Throughput (tons/hr).
4. Monthly Emissions (lb/month) = Annual Emissions (tpy) * 2000 (lb/ton) / 12 (months/yr).
5. Annual Emissions (tpy) = Emission Factor (lb/ton) * Maximum Annual Throughput (ton/yr) / 2000 (lb/ton).

Table 9. Shredder Fugitive TAC and HAP Emission Summary

Pollutant	HAP[1]	Fugitive Emission Factor[2]	Hourly Emissions[3]	Monthly Emissions[4]	Annual Emissions[5]
	(Yes/No)	(lb/ton)	(lb/hr)	(lb/month)	(tpy)
Acetaldehyde	Yes	[redacted]	1.68E-02	2.53E+00	1.52E-02
Benzene	Yes	[redacted]	6.17E-02	9.26E+00	5.55E-02
Butadiene, 1,3-	Yes	[redacted]	1.59E-03	2.39E-01	1.43E-03
Cadmium	Yes	[redacted]	2.40E-04	3.59E-02	2.16E-04
Cumene	Yes[6]	[redacted]	4.28E-03	6.42E-01	3.85E-03
Ethyl Benzene	Yes	[redacted]	1.31E-01	1.96E+01	1.18E-01
Hexane	Yes	[redacted]	1.89E-01	2.84E+01	1.70E-01
Hexachloroethane (PCA)	Yes[6]	[redacted]	5.15E-01	7.72E+01	4.63E-01
Hexavalent Chromium	Yes	[redacted]	1.06E-05	1.60E-03	9.58E-06
Isopropyl Alcohol	No	[redacted]	1.89E-02	2.84E+00	1.70E-02
Lead	Yes	[redacted]	1.69E-03	2.54E-01	1.52E-03
Methanol	Yes	[redacted]	2.87E-02	4.31E+00	2.59E-02
Methyl Chloroform	Yes	[redacted]	1.00E-02	1.50E+00	9.02E-03
Methyl Ethyl Ketone	No	[redacted]	2.83E-02	4.25E+00	2.55E-02
Methyl Isobutyl Ketone	Yes[6]	[redacted]	3.97E-03	5.95E-01	3.57E-03
Methylene Chloride	Yes	[redacted]	4.56E-03	6.84E-01	4.11E-03
Perchloroethylene	Yes	[redacted]	6.18E-03	9.27E-01	5.56E-03
PCBs	Yes	[redacted]	9.07E-04	1.36E-01	8.17E-04
Propylene	No	[redacted]	3.96E-02	5.94E+00	3.57E-02
Styrene	Yes	[redacted]	2.04E-02	3.06E+00	1.83E-02
Toluene	Yes	[redacted]	5.29E-01	7.94E+01	4.76E-01
Trimethylpentane, 2,2,4-	Yes[6]	[redacted]	2.17E-01	3.26E+01	1.96E-01
Xylenes (mixed)	Yes	[redacted]	4.88E-01	7.32E+01	4.39E-01
o-Xylene	Yes	[redacted]	1.80E-01	2.70E+01	1.62E-01

1. Per BAAQMD Rule 2-2-215, a Hazardous Air Pollutant (HAP) is any pollutant listed pursuant to Section 112(b) of the Clean Air Act.
2. Organic Fugitive Emission Factor (lb/ton) = [Stack Emission Factor (lb/ton) / Shredder Enclosure Capture Efficiency (%)] - Stack Emission Factor (lb/ton).
Particulate Fugitive Emission Factor (lb/ton) = [Stack Emission Factor (lb/ton) / Shredder Enclosure Capture Efficiency (%) / (1 - Venturi Scrubber Control Efficiency (%))] - [Stack Emission Factor (lb/ton) / (1 - Venturi Scrubber Control Efficiency (%))].
3. Hourly Emissions (lb/hr) = Fugitive Emission Factor (lb/ton) * Maximum Hourly Throughput (tons/hr).
4. Monthly Emissions (lb/month) = Annual Emissions (tpy) * 2000 (lb/ton) / 12 (months/yr).
5. Annual Emissions (tpy) = Fugitive Emission Factor (lb/ton) * Maximum Annual Throughput (ton/yr) / 2000 (lb/ton).
6. Note this pollutant is NOT a TAC.

Table 10. Cement Silo Parameters

Parameter	Value	Units
Source ID (S#)	S-10	
Maximum Annual Throughput[1]	21,900	tpy
Maximum Hourly Throughput[2]	2.5	tph

1. Maximum Annual Throughput obtained from BAAQMD PTO issued on October 22, 2018 for Plant # 208.

2. Maximum Hourly Throughput is calculated assuming the silo is operational for 8760 hours each year.

Table 11. Cement Silo Criteria Pollutant PTE Summary

Pollutant	Emission Factor[1]	Hourly Emissions[2]	Monthly Emissions[3]	Annual Emissions[4]
	(lb/ton)	(lb/hr)	(lb/month)	(tpy)
PM	0.0099	0.025	18.068	0.108
PM_{10}	0.0016	0.004	2.920	0.018
$PM_{2.5}$	0.0006	0.002	1.095	0.007

1. Emission Factors obtained from AP-42 Section 11.19.2 *Crusted Stone Processing*, Table 11.19.2-4 for product storage with fabric filter control.
2. Hourly Emissions (lb/hr) = Emission Factor (lb/ton) * Maximum Hourly Throughput (ton/hr).
3. Monthly Emissions (lb/month) = Annual Emissions (tpy) * 2000 (lb/ton) / 12 (months/yr).
4. Annual Emissions (tpy) = Emission Factor (lb/ton) * Maximum Annual Throughput (ton/yr) / 2000 (lb/ton).

Table 12. Cement Silo TAC Emission Summary

Pollutant	HAP[1]	Emission Factor[2]	Hourly Emissions[3]	Monthly Emissions[4]	Annual Emissions[5]
	(Yes/No)	(lb/ton)	(lb/hr)	(lb/month)	(tpy)
Arsenic	Yes	4.24E-09	1.06E-08	7.74E-06	4.64E-08
Beryllium	Yes	4.86E-10	1.22E-09	8.87E-07	5.32E-09
Hexavalent Chromium	Yes	4.14E-09	1.04E-08	7.56E-06	4.54E-08
Lead	Yes	1.09E-08	2.73E-08	1.99E-05	1.19E-07
Manganese	Yes	1.17E-07	2.93E-07	2.14E-04	1.28E-06
Nickel	Yes	4.18E-08	1.05E-07	7.63E-05	4.58E-07
Sulfate	No	8.42E+01	2.11E+02	1.54E+05	9.22E+02

1. Per BAAQMD Rule 2-2-215, a Hazardous Air Pollutant (HAP) is any pollutant listed pursuant to Section 112(b) of the Clean Air Act.
2. Emission Factors are from BAAQMD Handbook, Chapter 11.5, Cement Silo Filling (with fabric filter), excluding chlorine, per discussion with District staff.
3. Hourly Emissions (lb/hr) = Emission Factor (lb/ton) * Maximum Hourly Throughput (ton/hr).
4. Monthly Emissions (lb/month) = Annual Emissions (tpy) * 2000 (lb/ton) / 12 (months/yr).
5. Annual Emissions (tpy) = Emission Factor (lb/ton) * Maximum Annual Throughput (ton/yr) / 2000 (lb/ton).

Table 13. RTO Natural Gas Consumption Parameters

Parameter	Value	Units
Abatement Device ID (A#)	A-NEW1, A-NEW2	
Daily Hours of Operation (Operating Capacity)[1]	[redacted]	hr/day
Daily Hours of Operation (Standby Capacity)[1]	[redacted]	hr/day
Annual Hours of Operation (Operating Capacity)[2]	[redacted]	hr/yr
Annual Hours of Operation (Standby Capacity)[2]	[redacted]	hr/yr
RTO Burner Heat Rating (Operating Capacity)[3]	[redacted]	MMBtu/hr
RTO Burner Heat Rating (Standby Capacity)	[redacted]	MMBtu/hr
Natural Gas HHV[4]	1.02E-03	MMBtu/scf
Gas Firing Rate (Operating Capacity)[5]	[redacted]	MMscf/hr
Gas Firing Rate (Standby Capacity)[5]	[redacted]	MMscf/hr

1. Hours of operation for the RTO at operating capacity per day are assumed to be [redacted] hours per day. The RTO will operate at a standby capacity the remaining [redacted] hours of the day.

2. Annual Hours of Operation of the RTO conservatively assumed to be [redacted] hours for 365 days, which is [redacted] hours per year. The remaining time, the RTO is conservatively assumed to be operating at standby capacity.

3. Estimated heat rating for RTO operation at operating capacity based on a similar Schnitzer facility. The unit is assumed to fire at [redacted] MMBtu/hr for [redacted] hours during startup and at [redacted] MMBtu/hr during normal operation for the remaining [redacted] hours per day, per Schnitzer.

4. Natural Gas HHV obtained from BAAQMD's *Policy: Emission Factors for Toxic Air Contaminants from Miscellaneous Natural Gas Combustion Sources,* effective September 7, 2005.

5. Gas Firing Rate (MMscf/hr) = Heat Rating (MMBTU/hr) / Natural Gas HHV (MMBTu/scf) / 1E+06 scf/MMscf.

Table 14. Criteria Pollutant PTE Summary Per RTO

Pollutant	Emission Factor[1]	Maximum Hourly Emissions[2]	Daily Emissions[3]	Monthly Emissions[4]	Annual Emissions[5]
	(lb/MMscf)	(lb/hr)	(lb/day)	(lb/month)	(tpy)
POC	5.5	[redacted]	0.61	18.70	0.11
PM	7.6	[redacted]	0.85	25.84	0.16
PM_{10}	7.6	[redacted]	0.85	25.84	0.16
$PM_{2.5}$	7.6	[redacted]	0.85	25.84	0.16
NO_x	50	[redacted]	5.59	169.98	1.02
CO	84	[redacted]	9.39	285.56	1.71
SO_2	0.6	[redacted]	0.07	2.04	0.01

1. Combustion emissions from the flameless RTO are expected to be negligible; however, emissions are conservatively estimated based on AP-42 in place of manufacturer specifications. Emission Factors obtained from AP-42 Section 1.4 *Natural Gas Combustion,* Table 1.4.1 and Table 1.4-2. POC emissions are assumed to be equivalent to VOC emissions. PM_{10} and $PM_{2.5}$ emissions are assumed to be equivalent to PM emissions.

2. Maximum Hourly Emissions (lb/hr) = Emission Factor (lb/MMscf) * Gas Firing Rate at operating capacity (MMscf/hr).

3. Daily Emissions (lb/day) = Emission Factor (lb/MMscf) * [Gas Firing Rate at Operating Capacity (MMscf/hr) * Daily Hours of Operation at Operating Capacity (hr/day) + Gas Firing Rate at Standby Capacity (MMscf/hr) * Daily Hours of Operation at Standby Capacity (hr/day)].

4. Monthly Emissions (lb/month) = Annual Emissions (tpy) * 2000 (lb/ton) / 12 (months/yr).

5. Annual Emissions (tpy) = Emission Factor (lb/MMscf) / 2000 (lb/ton) * [Gas Firing Rate at Operating Capacity (MMscf/hr) * Annual Hours of Operation at Operating Capacity (hr/yr) + Gas Firing Rate at Standby Capacity (MMscf/hr) * Annual Hours of Operation at Standby Capacity (hr/yr)].

Table 15. Total RTO Emissions from Natural Gas

Pollutant	Emission Factor[1]	Maximum Hourly Emissions[2]	Daily Emissions[3]	Monthly Emissions[4]	Annual Emissions[5]
	(lb/MMscf)	(lb/hr)	(lb/day)	(lb/month)	(tpy)
POC	5.5	[redacted]	1.23	37.39	0.22
PM	7.6	[redacted]	1.70	51.67	0.31
PM_{10}	7.6	[redacted]	1.70	51.67	0.31
$PM_{2.5}$	7.6	[redacted]	1.70	51.67	0.31
NO_x	50	[redacted]	11.18	339.95	2.04
CO	84	[redacted]	18.78	571.12	3.43
SO_2	0.6	[redacted]	0.13	4.08	0.02

1. Combustion emissions from the flameless RTO are expected to be negligible; however, emissions are conservatively estimated based on AP-42 in place of manufacturer specifications. Emission Factors obtained from AP-42 Section 1.4 *Natural Gas Combustion,* Table 1.4.1 and Table 1.4-2. POC emissions are assumed to be equivalent to VOC emissions. PM_{10} and $PM_{2.5}$ emissions are assumed to be equivalent to PM emissions.

2. Maximum Hourly Emissions (lb/hr) = Emission Factor (lb/MMscf) * Gas Firing Rate at operating capacity (MMscf/hr) * 2 Units.

3. Daily Emissions (lb/day) = Emission Factor (lb/MMscf) * [Gas Firing Rate at Operating Capacity (MMscf/hr) * Daily Hours of Operation at Operating Capacity (hr/day) + Gas Firing Rate at Standby Capacity (MMscf/hr) * Daily Hours of Operation at Standby Capacity (hr/day)] * 2 Units.

4. Monthly Emissions (lb/month) = Annual Emissions (tpy) * 2000 (lb/ton) / 12 (months/yr) * 2 Units.

5. Annual Emissions (tpy) = Emission Factor (lb/MMscf) / 2000 (lb/ton) * [Gas Firing Rate at Operating Capacity (MMscf/hr) * Annual Hours of Operation at Operating Capacity (hr/yr) + Gas Firing Rate at Standby Capacity (MMscf/hr) * Annual Hours of Operation at Standby Capacity (hr/yr)] * 2 Units.

Attachment 2 – January 2019 Source Test Chlorinated & Fluorinated Compound Emission Factors

01/2019 Test Summary - Speciated Organic Compounds

Auto Fraction [redacted]

Compound	Carbon Atoms	CAS	Mol Wt	lbs/ton 100% Auto Bodies Average	100% Light Iron Average	Average
Trichloroethane, 1,1,1- (methylchloroform)	2	71-55-6	133.4	[redacted]	[redacted]	[redacted]
1,1-Difluoroethane	2	75-37-6	66.1	[redacted]	[redacted]	[redacted]
2-Chloro-3,3,3-trifluoropropene	3	2730-62-32	130.5	[redacted]	[redacted]	[redacted]
Chlorodifluoromethane	1	75-45-6	86.5	[redacted]	[redacted]	[redacted]
Dichlorodifluoromethane (F12)	1	75-71-8	120.9	[redacted]	[redacted]	[redacted]
Difluoromethane (HFC 32)	1	75-10-5	52.0	[redacted]	[redacted]	[redacted]
Hexachloroethane (PCA)	2	67-72-1	272.8	[redacted]	[redacted]	[redacted]
Methylene Chloride (DCM)	1	75-09-2	84.9	[redacted]	[redacted]	[redacted]
Norflurane (HFC134a)	2	811-97-2	102.0	[redacted]	[redacted]	[redacted]
Tetrachloroethene (PCE)	2	127-18-4	165.8	[redacted]	[redacted]	[redacted]
Trichlorofluoromethane	1	75-69-4	137.4	[redacted]	[redacted]	[redacted]